

Notes - Probability Part 4 - Permutations + Combinations Continued

❑ Permutations with Repetition

- Divide out the repeats $\frac{\text{#repeats!}}{}$

Ex: How many ways are there to rearrange the word "MICHIGAN"

$$2 \text{ "I"s} \rightarrow \frac{{}^8P_8}{2!} = \frac{40320}{2} = 20,160$$

Ex 2: MISSISSIPPI

$$\frac{{}^{11}P_{11}}{4!4!2!} = 34,650$$

Ex 3: Arrange 10 beads in a line. 5 beads are blue and 2 are green.

$$\frac{{}^{10}P_{10}}{5!2!} = 15,120$$

Multiple Events

→ Multiply your answers

Ex: You are planning a weekend trip to the cabin and you bring 5 dramas, 8 action movies, and 3 musicals.

- How many ways could you choose 1 of each kind of film?

$$\text{FCP } 5 \cdot 8 \cdot 3 = 120 \text{ ways}$$

- How many ways could you choose **2** action, **2** drama, and **1** musical?

$$\underset{\text{action}}{8C_2} \cdot \underset{\text{drama}}{5C_2} \cdot \underset{\text{musical}}{3C_1} = 28 \cdot 10 \cdot 3 = \underline{840}$$

Ex 2: How many 5-card poker hands have 3 hearts and 2 spades?

$$\underset{\text{hearts}}{13C_3} \cdot \underset{\text{spades}}{13C_2} = 286 \cdot 78 = \underline{22,308}$$

Do p. 642 #33-36

$$33) 13C_4 \cdot 13C_1$$

$$34) 13C_3 \cdot 13C_2$$

$$35) 49C_5 \cdot 42C_1$$

$$36) 4C_3 \cdot 4C_4$$